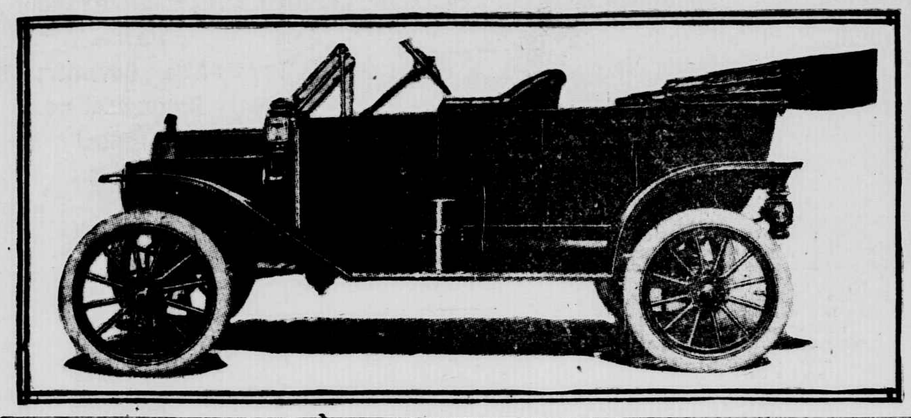
FORD MODEL "T" TOURING CAR.



HEATING OF CYLINDER

Cooling Systems Puzzled Early Engine Designers.

ITS CAUSES AND EFFECTS

Faulty Water Circulation Responsible in Some Cases.

IMPROPER DRIVING ALSO

Makes Machine Labor Too Hard, Which Is Equivalent to Overloading.

Perhaps few problems in the earlier days of gas engine manufacture puzzled the designer more than cylinder cooling. This is, perhaps, not surprising when it is remembered that the earlier internal combustion engineers gained their professional knowledge in the steam engine school, where the object aimed at was the retention of heat by inclosing the cylinder in a jacket of exhaust steam, which naturally had the reverse effect to that desired in a gas engine.

Although various cooling systems have been brought to a high state of perfection, doubtless finality has not yet been reached, and it is very questionable whether the ordinary motor user—both master and servant—has given that attention which he should to the cause and effect of undue cylinder heating. It is an acknowledged fact that overcooling is undesirable, but the cases when it occurs must form a very small percentage of the whole, as the natural cylinder surroundings and conditions all tend in the opposite direction.

It is, however, with the problem of overheating that we are dealing, and before diagnosing the causes we will first study the effects.

The space occupied by gases of all kinds is determined by their temperature, and as vaporized petrol is no exception to the rule, this has a very important bearing when considering motor-driven vehicles. The cubical capacity of the cylinder, other things being equal, determines its horsepower; such space must be charged with the correct quantity of fuel, which in turn must receive the treatment that enables it to give the best results.

Defective Water System.

If the water circulating system is in any way defective the cylinder becomes overheated and the incoming charge expanded beyond its usual dimensions, so that a full quantity is not drawn into the confined area.

Other things invariably follow overheating, such as pre-ignition and want of compression, the lubrication is all upset, as an oil that may be an excellent anti-friction element when subjected to a certain heat naturally has its limit, and when this is exceeded fusion takes place, the lubricating properties are lost, and, instead of the piston rings taking an easy sliding gas-tight travel up the cylinder sides, a grinding frictional movement follows. In this way more heat is generated, until perhaps seizure takes place, or, if events take another course, a broken connecting rod or crankshaft may result.

Not Sure Sign.

The fact of a little steam escaping from the radiator is not a sure sign that there is anything materially the matter. This remark applies even with greater force in hot climates in summer time, or where continuous long runs have to be encountered with steep gradients.

Cheap oils are false economy; one should only use a lubricant that carries entire confidence. The writer had an instance recently with a car which when running slowly and using a low-grade oil showed loss of power, and, though a careful examination of the circulation and lubrication systems proved all was in order, the trouble still continued. The oil was tested and found to be quite good for low temperatures, but almost valueless in high ones such as those met with in the class of engine we are considering, as almost the moment it entered the cylinder it was burnt up, so that part of the piston traveled in unlubricated ground. Deposits of carbon are much more likely to accumulate under the adverse conditions named, and eventually the carbon becomes an incandescent substance, giving rise to what is known as pre-ignition. Whether this is taking place may be easily proved by switching off the spark; if pre-ignition is taking place the engine will continue to run so long as there is a vestige of life left in the carbon deposits referred to. As such action takes place before full compression has been reached, it will readily be understood that an engine running under these conditions is extravagant in fuel and wear and weak as a tractive agent.

Causes of Overheating.

Having mentioned some of the evil effects of overheating we will pass on to the causes. The choking up of the radiator and circulating pipes is a very common source of trouble. When such is the case much depends upon the water that has been used; if only dirty, washing out is all that will be necessary; if water of a hard and brackish nature is employed the hotter it becomes the quicker the solids are deposited on the pipes and furring follows. The writer was in charge of some engines and boilers where surface condensers were in use, and where a nine-inch pipe carried the water off from the condenser tanks. In less than three years the pipe was so clogged with a hard lime deposit that only a two-inch stream of water could pass by. This is mentioned to bring home to motor users how important it is with the small-born tubes at their disposal to take every precaution against sediment.

If a circulating pump is the medium for water circulation it is not an uncommon error to assume that so long as this part of the engine is working the water is moving along the prearranged lines. This is not necessarily so, as an air lock may have been set up. Nearly all radiators are fitted with a draw-off tap, and if trouble is suspected from the direction suggested, this should be opened and the air released; when there is not a tap, it is better to break a joint than to allow the trouble to continue. One frequently sees exhaust pipes that have been subjected to intense heat, and many users at once attach the blame to a sooted-up silencer, and are much puzzled when taking it down to find such is not the case. As often as not the seat of trouble is in the water-circulating system or action.

In Hilly Districts.

Improper driving will produce overheating, particularly in hilly districts, by hanging on to the third or fourth speeds when ascending inclines and so causing the engine to labor; the effect of such action is equivalent to overloading. Unduly heated bearings or broken balls are active agents as friction producers, and bring about much the same result.

In dry weather any leakage from the radiator or connecting pipes is soon seen, but in wet, damp or foggy times, it is not so apparent, and an insufficient water supply is much more readily produced from loss of water by leaking than boiling. A dirty car oftentimes shows a tendency to cause overheating troubles. This is not surprising, for there are few better non-conductors of heat—and, consequently, are excellent heat retainers—than road mud.

When an engine has been lying unused for some time, rust will often accumulate in the cylinder jackets, and, being heavy, it falls to the bottom, collecting any other particles with it and forming into a solid mass, thus preventing the cooling element from getting to the lower portion of the exterior walls. Some, and even experienced, users recommend softening agencies that do not easily dissolve absolutely, but the writer strongly deprecates the introduction of any substance that does not form a saturated solution. There is nothing better nor cheaper than common washing soda, which has the advantage that it can be obtained at any village store. It is best to dissolve the soda in warm water before pouring it into the radiator, otherwise the crystals drop to the bottom and it may be some time before a proper solution is obtained.

ANCIENT MOTORISTS Vs. MODERN MOTORISTS.

The old-time motorists—those sturdy pioneers—had no use for the many modern weather-protection accessories. In those days the driver and passengers went forth fully prepared to battle with the elements, and caring naught for a chance rainstorm or howling gale. An extra rug, an oilskin cap and a leathern coat—this was all one needed in the worst of weathers, and if, perchance, the rain leaked through or the pioneer's feet became numbed, this was accepted with equanimity as part of the sport.

Times and ourselves have changed; motoring has become an armchair pastime, and therefore the vagaries of the weather have to be guarded against. Thus have come into existence the multitudinous forms of wind-screens, the hoods and coverings, the side doors and the scuttle dash—all doing their best to bolster up the effeminacy and luxuriousness of the modern motor user. But it will be agreed (leaving out of present consideration the desirability or otherwise of these many protections), all fail to attain their avowed object. What wind-screen but has a back draught, at one time for the driver, generally for the rear passengers. Has any one yet succeeded in producing an efficient and easily handled rain-cover for an open car? Of course, every maker claims that his own special production fills the bill, but the owner always comes to a different conclusion when the sudden thunderstorm bursts down.

Lubricate the Foot Brake.

The toggle mechanism of the foot brake at the rear of the gear case, and the pin holding together the two brake shoes, should be occasionally lubricated, as well as all the joints in the operative mechanism from the pedal to the brake itself.

Gasoline and a small brush are better for cleaning plug points than scraping.

Do not keep the ignition retarded, as it results in burnt valves and fouled plugs.

Always let off the pressure with a pressure fuel feed when leaving the car for the night.

Don't use engine oil to lubricate spring shackles, brake parts, etc.; a much thinner oil will give better results.

In hot weather a little water in the tunes will prevent deterioration.

Wash out cuts in cover with benzine, not gasoline, before applying stopping.

Never leave a cut cover, but clean and fill at the very earliest opportunity.

Never forget to turn off the fuel cock when leaving a car having gravity feed.

Although a new battery shows four on the voltmeter, don't be too certain that it does not require recharging unless you know the amperage.

JERSEY EXPERIMENT AROUSING INTEREST

First Northern State to Adopt Convict Labor on Roads.

The conversion of New Jersey, a northern state to the plan of prison labor will be of much interest to all good roads promoters of the country. For several years some of the southern states have been employing convict labor almost exclusively on road work, but in many of the northern states the plan has met with more or less opposition.

Col. Edwin A. Stevens, state road commissioner of New Jersey, after one season's trial of convict labor on the roads of his state, is enthusiastic in indorsing the policy generally. In a communication to the A. A. A. national good roads board the commissioner writes:

"The experiment of convict labor on state roads, which was proved to be a success in one week, is only the beginning of good road building beyond what we already have, and at a price which will spread out the money of the state beyond its present confines."

In describing the work in New Jersey Col. Stevens says:

"I gave orders to the man in charge that he was to give me a 'swagger' job there. In other words, he was to build the best section of road ever constructed in New Jersey. If after a rain there was as much as a teacup of water remaining on any spot the road was to be torn up instantly and relaid by these men. This is my school, and I believe that in the future men trained in prison—short-term men, if I cannot get others—men who have nothing else to do when they are turned out into private life again—can be taught the highest class of road building. They can be made to do the highest class of work.

Excellent Material in Prison.

"I do not expect a bank president to become a road builder, but there is excellent material in prison which can be trained in this way, and I expect to manufacture out of this labor a corps of men who will continue the work from choice when they have served their time. With the training I will give them they will be a valuable asset to New Jersey roads, and that is why I wanted nothing but the highest class of work done by this experimental class of men. They will get, if I can get it for them—and the prison authorities seem to be willing to co-operate in every way to make this work successful—commutation for good behavior and excellent work beyond that obtainable inside the walls."

In Colorado, Illinois, Michigan, Minnesota, Washington, Utah, California, Wyoming and several other of the northern states experiments have been made, and almost without exception satisfactory results have followed. The men have appreciated the privilege of living in the open air, their health and morals have improved, their work has been good and very little trouble has been given.

Men in Sing Sing prison, New York, are no longer required to wear stripes and have their heads shaved, and everywhere the tendency is toward doing everything possible to make the convict a better man when he leaves prison than when he entered.

The employment of convict labor on the roads is one of the many related topics to be discussed at the second federal aid good roads convention to be held under the auspices of the American Automobile Association in Washington, March 6 and 7. In establishing the national policy for future road building, the use of convict labor is one of the questions that are bound to come up. Much information on this subject has already been placed before the joint committee of Congress, which is soon to report on the whole subject of federal aid.

Prepared Under Federal Advice.

Many of the model highway laws in various states have been prepared under the advice of the road experts of the Department of Agriculture and all the data and statistics of the office of public roads are at the disposal of the legislatures.

In the last bulletin of the office of public roads it was stated that at the close of 1909 8.66 per cent of the roads in the United States were improved. This represents a gain in the total road mileage improved for the five-year period, 1904-1909, of 1.52 per cent, or, in other words, the percentage of improved roads has increased during this period from 7.14 to 8.66 per cent.

In the three years that have elapsed since then it is roughly estimated that the percentage of improved roads has gone well beyond 9 per cent and possibly close to 10 per cent. It is estimated that if 20 per cent of the public highways were improved—each highway being selected and improved with a view to the proportionate traffic upon it—a high degree of efficiency in highway transportation would be reached. It is figured that millions of dollars would be saved annually in the transportation of crops, the wear and tear on horses and vehicles, and in the minimizing of the waste in truck farming. Where roads are bad, the farmers frequently find it impossible to get their products to the shipping points and thus perishable products are wasted, perceptibly increasing the cost of living.

In the five years preceding March, 1912, the office of public road of the Department of Agriculture has built 215 object-lesson roads, in all about 300 miles of road fifteen feet wide, and by expert advice aided in the formulation of more than 650 model county road systems, resulting in most instances in beneficial reforms. It has also assisted twenty-six states in effecting equitable state-aid plans. The Secretary looks forward to the coming year as promising better results than at any time in the history of the movement for improved highways.

Watch Your Dust Pan.

In cold weather the dust pan under the engine should receive more than the average amount of attention, particularly upon cars having the under side of the motor well inclosed. Gasoline drippings are very likely to collect here, and they do not, of course, evaporate as rapidly in cold weather as in warm.

How to Guard Against and Fight Auto Fires

Fires in automobiles may be caused by a leaky gasoline tank, by loose gasoline pipe connections or by back firing in the carbureter. In case the carbureter catches fire, at once shut off the gasoline valve so that the flame may not be fed and may not spread to the tank. A blanket or robe soaked in water spread over the parts on fire will tend to smother the flames, but water should never be dashed on, as this only tends to spread the trouble.

It is wise always to keep on hand in the garage a liberal supply of hand-extinguishers, in condition for instant use, and to be sure that all are familiar with their use. A good homemade extinguisher may be evolved by dissolving a quarter of a pound of hypo-sulphite of soda in a pint of water, to which is added three ounces of ordinary ammonia. Place this mixture in thin glass bottles to be used as grenades or keep a quantity of it in a tank to be used in connection with a hand-pump in case of need.

When one experiences a sudden fire while on the road, when there is no extinguisher in the car, sand or earth may be used in checking the flames, but in this case there are apt to be very annoying, and even serious, after-effects from the particles of dirt and sand having found their way into the valves or carbureter. The thing to do, by all means, is to equip every car with a chemical hand extinguisher.

Using Temporary Battery.

Sometimes it is found desirable to use either temporarily or permanently a set of dry cells in the same compartment where a storage battery was formerly located. If dry cells are used in this manner, the battery compartment should be thoroughly cleaned to remove all traces of acid left by the storage battery. Otherwise, the cells will be attacked and quickly destroyed.

Short-Circuiting Batteries.

Users frequently condemn batteries for becoming too quickly exhausted when the trouble is no fault of the battery, but is due to a short circuit. A common cause of short circuiting which is generally unsuspected lies in stray strands, of which most wires are built up, coming into contact with metal parts which should not be touched by the wires. Very often when placing a wire under a nut or around a stud that is insulated from the rest of the metal one or two of these minute strands will not be secured and shortly will vibrate or be jarred against the machine in such a manner as to permit of a continuous flow of the current. As is to be expected, this contact will serve as an outlet for the current, with the result that the batteries will be quickly exhausted. If care is taken to secure the wire properly this form of battery complaint will be done away with. A quick method of testing a short circuit in the primary connections of an ordinary jump spark ignition system is to apply a voltmeter across the terminals of the entire battery while the commutator is standing at one of its neutral points. After observing the reading of the instrument, the cut-out switch should be thrown back and forth several times. If the circuit is perfectly insulated, there will be no difference in the reading under these circumstances. If a short circuit or a ground exists, however, the needle will fluctuate, as the open circuit reading is always higher than when the circuit is closed.

SOLVES OIL PROBLEM.

One Factory Has Complete Pipe System Over Big Space.

Lubricating hundreds of machines of every type used in the manufacture of automobiles is no small task. In a shop with five or six lathes and a proportionate number of other tools, it is no great undertaking to keep them properly oiled, but in a gigantic machine shop the distribution of oil so that it will be accessible to every machine operator is a different matter. At one big factory there is a complete pipe line oil system, forming a network of oil-distributing channels through more than twenty-eight acres of floor space.

This system receives its supply of oil from three 50,000-gallon tanks, sunk just outside the shop. These tanks contain, respectively, machine oil, cutting oil and motor oil. Dotting the machine shop are numerous oil taps, so regulated that but one gallon can pass through without a second opening the tap. Nearly 1,000 gallons of the three kinds of oil have been used each day this year in this plant. About 300 gallons of machine oil, 250 gallons of cutting oil and 200 gallons of motor oil was an average day's consumption.

Practically all the machine and motor oil is consumed by the machines which they lubricate, but the cutting oil is filtered and used over several times. It is caught under the machines in pans and taken to a filtering device, where the small particles of metal are separated from it. Then it goes back to the machine and is used again. It can be used and cleansed several times before it finally "wears out."

Locating Suspected Leaks.

An excellent way has been found to locate a suspected leak in the carburetor float and at the same time to lighten the float by getting rid of the gasoline that may have entered it. If the float is immersed in very hot water, the gasoline will be vaporized sufficiently to force its way out through a puncture and the spot may be located by watching the bubbles. The float should, of course, be removed from the water the instant bubbles cease appearing.

For use only with the electric hand warmer is a leather-covered, fleece-lined muff, and it is not beautiful in appearance, a fur muff being preferred by most women.

DON'T PICK ME OUT TO ASK----

By Ripley